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USES AND LIMITATIONS OF LABOUR PRODUCTIVITY STATISTICS

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Productivity is broadly defined as the ratio between output and the input of factors required to achieve it. This implies a quantitative relationship between the source or means of production and what is produced, and that therefore in this respect the relationship may be measured. A productivity ratio may compare the output with the total of all inputs, thereby forming a total productivity ratio, or it may compare output with one input only, known as a partial productivity ratio. Labour productivity is probably the best known partial productivity ratio, and is computed by dividing the volume or value of output by a measure of labour input, such as the number of hours worked or the cost of these hours. Similarly, a raw materials partial productivity ratio may be computed by dividing the output measure by the volume or value of raw materials consumed in the production process, and a capital productivity ratio by dividing the output measure by the amount of capital invested. For the total productivity ratio as well the partial productivity ratios, indices may be constructed by comparing the ratios for several successive periods with the ratios for a selected base period.

Productivity ratios and indices of productivity may be computed at various levels of aggregation. At the simplest level, productivity may be computed for the individual establishment, firm or enterprise. From this base, ratios and indices may be aggregated for each industry, for each economic sector and finally for the entir economy. At each of these levels, useful studies may be made of the ratios and indices of ratios, which serve a variety of purposes. At the national level, the indices are used to help in developing economic plans, fiscal strategy, forecasts of [illegible] production and requirements of labour, materials and other inputs to production. At the industry and establishment level, they sho

whether efficiency is improving and reveal the consequences of presonnel policy, new technology, increased investment and changes in production methods. By comparing indices of different enterprises economic planners can select the most efficient manpower and production policies and manufacturing processes and techniques. In general, productivity indices assist in planning and controlling the allocation and use of economic resources. The objective of this paper is to discuss some of the different uses to which the different measures of labour productivity may be put, with a few words concerning limitations.

Labour productivity as a guide to efficiency in the establishment

Labour productivity is a rough measure of the effectiveness with which labour, one of the most important productive resources, is used. It has important social implications because it takes into account not only the chief source from which industrial and social desires are met (i.e. output) but also of the major source of getting that output (i.e. work).

The examination of labour productivity forms a natural starting point for establishment-level studies designed to assess the performance of a single establishment or firm, because labour productivity is relatively easy to measure, and particularly because the efficient utilisation of labour is often a good guide as to the general efficiency of the firm. Studies of labour productivity based on a firm or group of firms help by enabling them to assess their position with regard to that of their competitors. By comparing their labour productivity at various stages of production, with that of other firms, it is possible to identify which departments would be capable of improvements.

One of the main advantages of measuring labour productivity in a firm is that it gives a measure of what real progress has been made in the firm's operations. It may differ form the results shown by the ordinary accounts of the firm's activity, but it may be used as a guide for increasing wages, which is more suitable than using profits.

At the establishment or firm level, labour requirements in terms of hours of work can be forecast by forecasting output, and then dividing that by the projected labour productivity, in terms of output per hour of work. Thus, the labour productivity can be used as a tool for manpower planning within establishments or firms.

By establishing productivity trends and comparing them among groups of establishments which differ from the point of view of production process, work organisation, degree of integration, wage payment system, etc., it is possible to decide upon the most efficient method of organisation. In this respect, they may draw up plans for expansion or reduction of the size of the plant, whether to shift production from one area to another, and so on, with a fairly clear knowledge of the facts concerning labour. However, if these inter-establishment comparisons are to have the maximum possible effect, both as a stimulant to efficiency and as a source of technical information, all the relevant facts of the situation in each plant, factory, firm, etc, should be known.

The very nature of the information needed for a study of labour productivity may draw the attention of certain establishments to the importance of adopting a satisfactory accounting system and to keep a check on all data reflecting the efficient (or inefficient) working of the establishment. The universal drive for increased productivity has stressed the importance of obtaining better statistical information on productivity and the necessity of developing improved methods of measurement.

Labour productivity is one measure of the efficiency with which labour is used as an input for the production of goods or services. But efficiency is subjective. Since conditions determining efficiency vary from one country to another, from one industry to another, from one region to another, and so on, higher labour productivity need not necessarily denote higher efficiency. Different types and qualities of products are required according to different demand structures. Different availability of natural resources or raw materials may call for different techniques of material handling and fabrication. Conditions in different countries or regions may vary so much that different methods and organisation of work are necessary. Therefore, labour productivity alone is not sufficient to measure the over-all efficiency of a particular establishment or a particular production process. Output per unit of all input should be studied. For example, it may not always be efficient to invest in labour-saving machinery, although it may increase labour productivity and reduce unit labour cost. If wages are high, the price of new machinery is low, interest rates are low and the existing machinery is nearing the end of its useful life, then investment in labour-saving machinery could produce large gains in efficiency. However, if one or more of these conditions is reversed, it might be more efficient to continue to use existing machinery longer. In fact, it may well be that establishments with low labour productivity are more efficient than those with higher levels, because they economise on the use of other inputs.

It is often most meaningful to compare both rates of change of labour productivity as well as their levels. If an establishment's productivity is increasing at a slower rate than the average for the industry as a whole, or than similar competitive establishments, there will be more cause for concern if at the start of the period its level of productivity was lower than the average for the industry or for the other establishments.

Labour productivity as an element in wage setting

The relation between changes in productivity and changes in the standard of living is one reason behind the interest in measuring labour productivity. Productivity growth is considered to be one of the most important sources of a rise in total output and income, and it is by far the most important source of the rise in output and income per person employed. A slowing down in the rate of growth of labour productivity implies slower improvement in the ability to raise the level of consumption, to reduce poverty and thus to enhance the quality of life. Increases in real income arising from the growth in productivity are generally distributed as increases in real compensation to the suppliers of the factors of production, among them, labour. If productivity is constant, the output of goods and services can be increased only by using more inputs. All of the added output will be needed to compensate the providers of these additional units of input at the existing rates of compensation, and there will be no surplus left for raising the level of real factor compensation for the providers of either the original or the added units of input. In these circumstances, the providers of any one input (eg. labour) could increase their real compensation only at the expense of the providers of some other input.

However, if productivity is rising, the real income of the providers of some or all inputs can rise without the real incomes of the others falling. Thus labour productivity measures may be used as indicators as to the extent to which real income and the standard of living (as measured by the consumption of goods and services) can rise through time. Compensation in current prices per unit of labour input can rise at the same rate as labour productivity without requiring any increase in the average price of output.

If output measured in current prices equals Q and the hours of work required to produce the output (Q) equal L, then the labour productivity at that one point in time equals output at current prices divided by hours of work to produce that output = Q/L.
If w equals the wage and other benefits paid per hour of work, then the unit labour cost per unit of output is $\frac{w.L}{Q}$.
Assuming that output rises by 10% over a specified period, while the labour input in terms of hours of work remains constant, and while wages and other benefits per hour of work increase by 10% over the same period, the unit cost of the labour (in terms of wages and other benefits) per unit of output will remain constant.
Unit labour cost per unit of output = $\frac{(1.10).w.L}{(1.10).Q} = \frac{w.L}{Q}$

Therefore an increase in the compensation of labour which is proportional to the trend of the increase in the average labour productivity does not raise unit labour cost, and therefore increases in the price level are not needed to pay for it, and so are non-inflationary, and does not necessarily alter the distribution of output between labour and non-labour inputs. For these reasons, increases in productivity of labour have often been used as standards for deciding on appropriate wage increases, and an annual productivity improvement factor has become a feature of many collective bargaining agreements.

However, if, as is almost always the case, different types of labour are necessary for production, these propositions about the relation between increases in average labour productivity and in compensation only apply if the mix of labour used has remained constant. If the mix is changing, increasing the compensation of each kind of labour separately by the increase in average productivity per unit of unweighted labour input could raise or lower both labour's share and the unit labour cost.

The overall labour productivity can rise in an establishment if the output remains constant, but employment falls. This can occur in the case where more productive workers are substituted for less productive workers. But in this case, the unit labour cost will most likely rise, since more productive workers are usually more highly skilled and therefore more highly paid.

For example:

In an establishment, type A workers are twice as productive as are type B workers, that is, a type A worker will produce twice as much output in one hour of work as a type B worker.

In period 1, 25 type A workers and 50 type B workers produce 1000 units of output on average per hour of work.

In period 2, 30 type A workers and 40 type B workers produce 1000 units of output on average per hour of work.

Thus, the output has remained the same, while the total number of workers has fallen, so that average labour productivity for all workers taken together has risen (1000 ÷ 75 for period 1 and 1000 ÷ 70 for period 2). However, the mix of the workers has been altered, in that 5 type A workers have replace 10 type B workers, who are less productive. Since type A workers probably receive higher wages than type B workers, the average hourly earnings of all workers together have risen, although each worker still receives the same as before. Thus, there is no basis in productivity change for any increase in the compensation of either group separately. If broad national statistics are being studied rather than those for just one establishment, it can be seen that a shift of labour between industries from, for example, agriculture to manufacturing, could have the same effect as a shift between occupations.

Labour productivity as a basis for Government wage and price policies

One prominent use of the average labour productivity concept as a guide for wages may be found in the incomes policies of several national governments. "The general guide for non-inflationary wage behaviour is that the rate of increase in wage rates (including fringe benefits) in each industry be equal to the trend rate of overall productivity increases. General acceptance of this guide would maintain stability of labour cost per unit of output for the economy as a whole, though not of course for individual industries". Exceptions to a policy of tying particular wage changes to national productivity trends relate to the shortages and surpluses of labour in particular geographic or occupational labour markets, or to instances in which wages in the initial period are considered to be inequitably low or inequitably high. In circumstances in which it is considered desirable that wage rates should move with the overall productivity changes, the relationship must be sufficiently loose to enable wage rates to rise faster in some industries than in others to prevent wage rigidity, which could cause stagnation between industries.

In general, it is not always a good idea to use the changes in productivity at the industry level for calculating changes in compensation. As stated before, if compensation in an industry rises at the same rate as output per hour of work in that industry the unit labour cost will remain constant. However, if this industry is used as the reference point for changes in each of the other industries, the result would soon be very different levels of pay in different industries for work of comparable difficulty requiring comparable skill. These wage differences would be unrelated to shortages or surpluses of labour in these industries. Those

industries with low productivity growth would find it hard to recruit labour, and workers in these industries would regard their compensation as inequitably low. The industries with high productivity growth would not be able to pass on lower unit labour cost to their customers in the form of lower prices and their growth would therefore be restricted.

The uses of productivity measures as a guide for setting prices and wages are easiest to document as expressions of public policy. There must be many more instances of their unrecorded use by private-decision makers, both for price setting and wage setting.

Labour productivity as a basis for international comparisons

Changes in levels of labour prodvctivity, when studied in conjunction with other factors such as unit labour cost are also of interest when making international comparisons. International differences in labour productivity play an important role in explaining some of the differences in the standards of living or per capita income between countries.

There is particular interest nowadays in the productivity of labour in those countries producing internationally traded goods as it can be an important determinant of the pattern of exports and imports between countries. For instance, if output per unit of labour input in one country is lower or growing less rapidly than it is for that particular industry in all other countries, this could be an important factor leading to increases of imports of the article produced in that industry into the latter country. A full analysis of changes in imports would of course have to include many other factors, such as levels of and changes in the money wages of workers in that industry in the different countries, and of costs other than the labour costs (such as capital and raw material), exchange rates among the national currencies,

transportation cost and tariff and non-tariff barriers to trade. However, technological knowledge, resources, prices, product demand and so on vary greatly from one country to another. In addition to labour productivity statistics, and data on all types of costs involved, what is needed is some idea of optimum resource use and the degree to which the practices in each country fall short of it. This optimum cannot mean more than the maximum of the product per unit of human effort. The aggregate product must be at satisfactory levels: hours of work must leave sufficient leisure and their pace must not overtax the kind and variety of goods produced, and their distribution, in so far as this is determined by the productive process itself, cannot be ignored. These limitations are present in any study of labour productivity, and cannot easily be eliminated.

Labour productivity and forecasting and business cycle analysis

One major use of productivity statistics is for measuring and forecasting such economic variables as potential gross national product and labour requirements. Potential GNP is defined as the output that could be produced at a high employment level, and it is estimated from trends in the growth of the labour force, average hours of work and labour productivity, together with an assumption about the unemployment rate at high employment level.

The use of productivity measures in forecasting is closely related to their use in business-cycle analysis and hence in forming monetary and fiscal policy. It has been established that output per hour of work tends to fall, or to increase at a slower rate when economic activity is contracting, especially in the early stages of recession. This is because : in a recession, output often

falls more quickly than hours of work, since some employees are needed as long as any output is being produced, some employees are kept on the payroll even though they are not needed to produce output since they are engaged in maintenance work or in research and development, or similar activities; other workers simply have a lighter workload; employers prefer to retain certain labour, because otherwise skilled or specialised workers may not be available when more labour is needed in response to the demand recovery; it takes time for employers to recognise and react to a fall in demand: a substantial decline may at first appear as just a small disturbance in the establishment's activity; unless this decline is expected to persist, employers tend not to lay off workers; it is only when the extent of the decline is fully appreciated that action will be taken to reduce labour inputs and that productivity begins to rise again. There are some factors which tend to offset these generalities but they are not usually strong enough to reverse the above effects. Workers with the least skill or experience are the most likely to be laid off during a recession. Workers may also work harder during a recession because jobs are scarce and they do not wish to risk losing employment, thereby maintaining a certain standard of productivity. In a business-cycle recovery, the effects of the recession on productivity are reversed, and productivity usually rises faster than the long-run trend, at least in the early stages of recovery. A fiscal or monetary policy designed to restore full employment after a recession would have to take this tendency into account in determining the type of stimulus which would be appropriate.

Labour productivity as a source for economic growth

Increases in productivity involve all sources of growth, with the exception of increases in the quantity of input.

Limitations

Unlike official series of unemployment, employment, prices, and so on, official measures of productivity are made up of data components which come from separate or independent surveys which are conducted for purposes other than measuring productivity. Even in measuring productivity for detailed industrial categories, data from two or more independent surveys of establishments must usually be combined. For measuring productivity at higher levels of aggregation, many different data sources may be combined. Not only do the data on the value of output, price changes and labour inputs come from different sources, but also for each of these components of labour productivity series a number of different sources must be used. Data sources are not always governmental: they may comprise trade associations and large companies. Nor are all the sources statistical surveys: some data are by-products of activities of regulatory agencies. This situation does not facilitate the development of objective measures of the margin of error in the productivity estimates, especially the more aggregated ones. The well-established methodologies for estimating sampling error that are applied to other official statistics, such as the unemployment rate, cannot be applied to the official productivity measures.

In addition to problems arising from the different data sources, there are also many measurement problems. With regard to output, the difficulty varies greatly across sectors and industries. At one end of the scale is the simple standardised product that does not change either over time or from place to place. At the other end are firms, establishments or agencies, etc, in the government or non-profit-making sector, for which output measurement is extremely difficult. Along the spectrum between the two are products and services for which measures of output are available, but with

varying degrees of difficulty. When the data for constructing aggregate measures comprise fairly good and weak data, the resulting measures necessarily suffer from some of the drawbacks of the weak components.

Criticisms may also be levelled at the measures of labour input used for constructing the labour productivity series. In general, the labour input comprises the unweighted sum of the hours of work of all workers engaged in the production of the output measured. The data come from different sources, in many cases, and sometimes involve imputations and assumptions; in most cases they are taken from programmes not specifically designed to measure productivity. However, there are very often no direct data on hours worked for a large part of the work force engaged either directly or indirectly in the production of the output, such as administrative and supervisory workers, managers, research workers, and so on. Very often the hours of work measure comprises the number of hours paid for, rather than hours actually worked, which is a better measure of the actual labour input associated with the output. In addition, the labour input should be weighted, to take account of changes in the composition of labour, such as changes in skill, education and experience.

Other deficiencies occur in the data available for computing labour productivity measures. When computing an index, data for some years may be missing. If interpolation or extrapolation for these years from other years is used to fill the gaps, the estimates may be incorrect if drastic changes took place in conditions. There may have been changes in the methods of recording data; there may be problems with the price data used to deflate the series, which could distort the evaluation of output at constant prices.

Productivity, when viewed within the traditional productive system, is a basic source of well-being. It is the primary source of increase in real compensation per hour of work. But the output measures used in existing productivity measures are concerned only with changes in welfare that operate through the goods and services sold on the market, and therefore do not measure many important changes in welfare. Some changes are directly related to the economic system, such as the cost of relocating workers laid off because of technological change, environmental damage done by industrial pollution . Others, like changes in health and safety, while less closely related to the economic system, are clearly of great importance. The increase in all the physical, social and psychological amenities of life may not necessarily be proportionate to the advances in real income.

The welfare choices available to everyone from productivity will be jeopardised if productivity fails to advance. Productivity advance helps consumers to make their welfare choices, and a decline in productivity hurts this process. Whatever the process of consumer choice and the outcome of this choice, the input to this process of real income and of the goods and services chosen should be kept distinct and measured as well as possible within the economic production boundary.

It is believed by many that productivity measures should be extended as fast as possible to all divisions of the economy, but if this extension is made in an uncritical manner to inappropriate areas, it will be wasteful and possibly harmful. Labour productivity statistics are not always helpful. Where there is no clear measure of output and where there is no clearly understood procedure for converting input into output, such as schools, hospitals, government agencies, and so on, even attempting to measure labour productivity may be harmful. These activities do not always have clearly defined aims or techniques for achieving these aims. Since they do not actually sell their output on the market, it is not easy to evaluate their products or services, or the value attributed to them by those who use them. If the development of clear and measurable objectives for these activities is stressed too hard, in order to facilitate productivity measurement, there may be unanticipated and undesirable effect, Less important but more easily quantifiable goals may replace the more important but less measurable aims.

Many types of activity do not have clearly demonstrable techniques, but use instead socially validated processes, which include legal, symbollic and ceremonial activities, depending on faith, belief or trust to achieve their objectives. The efficiency of these activities depends on the agreement shared by producers, consumers and the public that the processes work. This depends on the cultivation of a shared belief in the legitimate capacity of the processes to perform certain kinds of work. If the productivity of such people as ministers of the church, lawyers and teachers is to be measured, it could perhaps lead to some undesirable results undermining the confidence of both the personnel and the clients, with the effect of removing the legitimacy of the products and the processes.

Changes in measures of labour productivity are subject to misinterpretation by users, who may incorrectly associate changes in these measures solely with the changing skill and effort of the workforce. Output per measure of labour input is also affected by changes in technology, the capital-labour ratio, changes in inputs of intermediate goods, rates of capacity utilisation and many other factors, as well as by the interaction of these factors. The measures do not take into account the consequences of activity which do not pass through a market, such as the deterioration or improvement of the environment. Deterioration is not counted as a cost nor as a deduction from the product, and improvement of the environment is not counted as an addition to the product.

Finally, it must be remembered that, of itself, productivity measurement merely discloses the extent of gains or losses of productivity. It does nothing to increase productivity. It is a tool, and should be recognised as such.

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